Displaced middle-third clavicle fracture management in sport: still a challenge in 2018

Displaced middle-third clavicle fracture management in sport--still a challenge in 2018. Should you call the surgeon to speed return to play?

Greg A Robertson (1)

Alexander M Wood (2)

Christopher W Oliver (1), (3)

1) Edinburgh Orthopaedic Trauma Unit, Royal Infirmary of Edinburgh, 51 Little France Crescent, Edinburgh EH16 4SA

2) Orthopaedic Department, Leeds General Infirmary, Great George St, Leeds LS1 3EX, United Kingdom

3) Physical Activity for Health Research Centre, The University of Edinburgh St Leonard's Land, Edinburgh EH8 8AQ

Correspondence to Greg Robertson: greg_robertson@live.co.uk

Prof Chris Oliver is on Twitter @CyclingSurgeon

Introduction

The management of clavicle fractures should be guided by fracture location (middle-third/lateral/medial) and fracture configuration (undisplaced/displaced/communited)[1-5]. Current management guidelines recommend surgical management for middle-third fractures, which are completely displaced, shortened by 2cm or comminuted, as this can facilitate an earlier return to sport and improve final shoulder function[2 3 5].

Our systematic review assessed all clavicle fracture studies that recorded return to sport, to determine the effect of different treatment methods on return rates and times to sport[6]. Twenty-three studies were included: eight were prospective cohort studies, fifteen were retrospective cohort studies[6].

Here we summarise the results from that systematic review, to determine the optimal management of middle-third clavicle fractures. Such information provides sport physicians and surgeons with an evidence-based treatment algorithm for these injuries, allowing optimisation of return rates and times to sport for affected athletes.

Review Methodology

The systematic review was collated following a search of: CINAHAL, Cochrane, EMBASE, Google Scholar, Medline, PEDro, Scopus, SPORTDiscus, Web of Science[6]. Studies were considered for inclusion if they reported on patient cohorts who were active in sport pre-injury, had sustained a fractured clavicle, and attempted to return to sport post-injury[6]. Documentation of either return rate or time to sport post-treatment was necessary for inclusion[6].

Return rates and times to sport were the primary outcome measures. Return rates to pre-injury level sport, rates of and times to fracture union, re-intervention and complication rates were the secondary outcome measures[6]. Return to sport was defined as the resumption of sporting activities; return to pre-injury level of sport was defined as resumption of pre-injury sporting activities[6].

Middle-Third Fractures

Ten of the studies reported on middle-third fractures(n=304): three included conservatively-managed undisplaced fractures(n=22); five included conservatively-managed displaced fractures(n=85); nine included surgically-managed displaced fractures(n=197)[6].

Six studies were retrospective cohort studies; four were prospective cohort studies[6]. One study comprised Level 3 evidence; nine comprised Level 4 evidence[6].

No study provided a set definition for fracture displacement: fractures were arbitrary classified as 'displaced' or 'undisplaced'[6].

For the whole cohort, the mean return rate was 97%; the mean return time was 12 (2-16) weeks[6].

Undisplaced Middle-Third Fractures

Conservative Management

For undisplaced middle-third clavicle fractures, conservative management was the sole treatment modality[6]. This comprised collar and cuff immobilisation for two to six weeks, with early mobilisation and strengthening exercises[6]. The mean return rate was 95%; the mean return time was 10.6 (10-13) weeks[6]. There were no reported complications[6].

Displaced Middle-Third Fractures

Surgical Management

For displaced middle-third fractures, there were two main methods of surgical fixation – open reduction with plate fixation (ORIF) or intramedullary nailing (IM Nail)[6]. The choice of fixation was guided by fracture configuration: two-part fractures were treated with either technique; three-part and comminuted fractures were treated with ORIF, to ensure adequate reduction and stabilisation[6].

For surgically-managed displaced middle-third fractures, the mean return rate was 98%; the mean return time was 9.4 (2-24) weeks[6]. For fractures managed with ORIF (n=129), the mean return rate was 98%; the mean return times was 9.3 (6-24) weeks[6]. For fractures managed with IM Nail (n=68), the mean return rate was 99%; the mean return time was 9.9 (2-14) weeks[6]. For ORIF, the re-intervention rate ranged 0-18%, while for IM Nail, the re-intervention rate ranged 67-100%[6].

Conservative Management

Conservative management of displaced middle-third fractures comprised collar and cuff immobilisation for six to eight weeks, followed by progressive mobilisation and strengthening exercises, once clinical and radiological union had been achieved[6]. The mean return rate was 93%; the mean return time was 21.5 (12-78) weeks[6]. Refracture rates ranged 0-57% and delayed surgical intervention rates ranged 0-29%[6].

On meta-analysis comparison, of surgical versus conservative management, for displaced middle-third fractures, the results were:

Return Rates: OR 0.20: 95%CI 0.05–0.83, $p<0.027$; $I^2= 0\%$, $p=0.68$ (Figure 1)

Return Times: MD 12.1 weeks: 95%CI 5.58–18.62, $p<0.001$ (Figure 2)

Post-hoc power analysis confirmed the included sample size was sufficient to detect the observed differences, with Type 1 errors set at 0.05 and Type 2 errors at 0.20 (minimum cohort size: 57 per group).

Conclusions

Clavicle fracture management should be guided by fracture location and configuration. For middle-third fractures, conservative management of undisplaced fractures provides good return rates and times to sport. For displaced middle-third fractures, surgical management can offer improved return times to sport over conservative management. The majority of evidence guiding this, however, is Level 4 quality. Future well-designed randomised controlled trials are required to confirm the optimal management techniques for these fractures.

References

1. Bishop JY, Jones GL, Lewis B, et al. Intra- and interobserver agreement in the classification and treatment of distal third clavicle fractures. Am J Sports Med 2015;**43**(4):979-84 doi: 10.1177/0363546514563281[published Online First: Epub Date]|.
2. Jones GL, Bishop JY, Lewis B, et al. Intraobserver and interobserver agreement in the classification and treatment of midshaft clavicle fractures. Am J Sports Med 2014;**42**(5):1176-81 doi: 10.1177/0363546514523926[published Online First: Epub Date]|.
3. McKee MD, Pedersen EM, Jones C, et al. Deficits following nonoperative treatment of displaced midshaft clavicular fractures. J Bone Joint Surg Am 2006;**88**(1):35-40 doi: 10.2106/JBJS.D.02795[published Online First: Epub Date]|.
4. Robinson CM, Cairns DA. Primary nonoperative treatment of displaced lateral fractures of the clavicle. J Bone Joint Surg Am 2004;**86-A**(4):778-82
5. Hill JM, McGuire MH, Crosby LA. Closed treatment of displaced middle-third fractures of the clavicle gives poor results. J Bone Joint Surg Br 1997;**79**(4):537-9
6. Robertson GA, Wood AM. Return to sport following clavicle fractures: a systematic review. Br Med Bull 2016;**119**(1):111-28 doi: 10.1093/bmb/ldw029[published Online First: Epub Date]|.